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ÆTILOGY OF DEVIATIONS,
SPURS, AND RIDGES
OF THE NASAL SÆPTUM

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ÆTIOLGY OF DEVIATIONS, SPURS, AND RIDGES OF THE NASAL SÆPTUM.*

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IT is with considerable hesitation that I present for your consideration some thoughts upon the ætiology of deviations, spurs, and ridges of the nasal sæptum, especially since the subject has been so ably, clearly, and fully discussed by different members of this association on several different occasions. After considerable study of the subject, however, I have concluded that some points have been overlooked which it is necessary to consider in order to explain why deviations of the sæptum are so frequent in their occurrence, and often so exceedingly peculiar as regards their form, extent, and location.

Deflections of the nasal sæptum are ascribed to a variety of different causes. These may be divided into predisposing and exciting causes.

I. PREDISPOSING CAUSES.—The two main predisposing causes are diathesis and racial characteristics.

* Read before the American Laryngological Association at its eighteenth annual congress.

1. *Diathesis*.—That diathesis is an important predisposing cause of deviations of the sæptum may almost be said to be self-evident, since it is a fact of clinical observation, verified by nearly all observers, that deflections of the nasal sæptum are exceedingly common among persons suffering from the strumous, syphilitic, tubercular, or rhachitic diathesis. Loewy * and Loewenberg † have emphasized the influence of rickets as a predisposing cause, perhaps laying more stress upon this factor than any other authors; and Harrison Allen ‡ calls attention to the influence of cretinism in the production of deformities of the nasal chambers.

2. *Racial Characteristics*.—The part that racial characteristics play in the production of deviated sæpta is an exceedingly interesting topic of study. All writers on this subject are unanimous in showing that deviations of the sæptum are vastly more frequent among the civilized than among the savage races. For instance, among the Europeans and Americans the percentage varies from sixty to eighty per cent., while among the Mongolians, the Africans, and the Polynesians the deviation is found in but about twenty per cent. The increase in frequency of deviation of the sæptum among the civilized, and particularly among the Europeans and Americans, is ascribed to two causes: First, to the increase in the cranial development and the enlargement of the facial angle; and, second, to the admixture of the different races.

Ecker and Lissauer # have demonstrated that under

* *Berliner klinische Wochenschrift*, 1886, No. 47.

† *Zeitschrift für Ohrenheilkunde*, Wiesbaden, 1883, Bd. xiii, S. 11.

‡ *New York Medical Journal*, 1895, vol. lxi, p. 139.

Annales des malades de l'oreille et du larynx, 1892, tome xviii, p. 782.

the influence of an increased development of the cranial mass the schematic line formed by the cranial vertebræ has a tendency to curve in proportion as we advance in the evolutionary transformation. The sæptum, accordingly, describes a movement of rotation, from above downward, from backward forward, around the body of the sphenoid taken as a centre.

Thus it will readily be seen that as this process of rotation takes place, the angle formed between the frontal, the superior maxillary, and the sphenoid bones for the accommodation of the sæptum becomes proportionately greater, and as the posterior portion of this angle widens, the anterior portion becomes correspondingly narrowed, which gives less room for the sæptum, particularly the anterior portion. This would account for the seeming redundancy of the sæptum in many cases, there being apparently insufficient room for its accommodation, requiring it to become more or less incurvated or wrinkled, especially the cartilaginous portion.

These studies have been further pursued by Potiquet,* whose researches were conducted on four hundred skulls in the museum in Paris, from which he shows that the nasal sæptum is more prone to lateral curvature as the angle of the face is more inflected in its antero-posterior direction, and that this angle is more and more inflected in an ascending series as we rise from the anthropoid to the European male.

The cause of the rarity of deflections of the sæptum among the less civilized races is believed to be due to the purity of these races. Among the purer races the features of the people are so much alike that it is with

* Étude critique sur l'étiologie des déviations de la cloison nasale.
Méd. moderne, Paris, 1892, tome iii, p. 153.

the utmost difficulty that a skilled physiognomist is enabled to distinguish between individuals without a close acquaintance with them. And thus we find that among the Mongolians, the Malays, the Arabs, the Africans, the Polynesians, and the American Indians the shape of the sæptum and the interior of the nose vary as little as does the external appearance of the nose.

Further studies in this direction show that an increase in the frequency of deviations of the sæptum corresponds very closely with the degree of admixture of the different races. This admixture in the more civilized countries, occurring largely as the result of conquest and of immigration, has been taking place from the earliest times, until modern Europe and America of to-day represent this admixture of the races in the highest degree.

The evolutionary changes that have taken place by this admixture are also readily seen in heterogeneity of the features of our people, as will be observed from the fact that no two persons will be found in whom all the features very closely resemble one another. Therefore, as Potiquet observes, "it would not be extravagant to say that a man has only exceptionally the sæptum which belongs to him."

Martin * observes that these anomalies all seem to be more clearly explained by the blending of different racial types than by evolutionary or devolutionary changes from a prognathous to an orthognathous type.

Delavan † in his most instructive article on the *Ætiol-*

* *Journal of the American Medical Association*, 1894, vol. xxiii, p. 491.

† *Transactions of the American Laryngological Association*, 1888, vol. ix, p. 202.

ogy of Deflections of the Nasal Sæptum, also emphasizes the greater prevalence of deviated sæpta among the civilized than among savage races, and also points out the fact that the aquiline type of nose, as illustrated in the Slav, the Hebrew, and the ancient Roman,* is particularly apt to be associated with deflections. A notable exception to this observation is the fact that the North American Indian, while possessing an aquiline nose, rarely has deflection of the sæptum. This is to be explained by the fact that the Indian belongs to a primitive and pure race, and also by their higher physical development on account of their outdoor life, and, as has been pointed out by Catlin,† by the habit among the Indian mothers of closing the mouths of their children and compelling them to breathe entirely through their noses from their earliest infancy, which conduces to a proper development of the nose.

II. EXCITING CAUSES.—The exciting causes of sæptal deflection may be either internal or external.

1. As internal exciting causes we have (*a*) defective development, (*b*) diseases of the sæptum, and (*c*) diseases of other portions of the nose.

(*a*) *Defective Development.*—In studying deflections of the osseous and cartilaginous sæptum, it is important to call attention to some points in the anatomy of the sæptum. It will be remembered that the nasal sæptum is composed practically of two bones, the perpendicular

* In the anthropological collection of the Peabody Museum, at Cambridge, Mass., is a cabinet containing eighteen well-preserved specimens of skulls taken from ancient Roman tombs. Delavan found that among these there was hardly a single instance in which the sæptum was straight, while in several of them the degree of deflection was excessive, and far beyond that usually seen.—*Loc. cit.*, p. 205.

† *The Breath of Life*, Reprint, New York, 1872, p. 16.

plate of the ethmoid and the vomer; and one cartilage, the triangular cartilage of the nose. The perpendicular plate of the ethmoid bone is a thin flattened lamella, which descends from the under surface of the cribriform plate, or the horizontal portion of the ethmoid bone, forming part of the anterior fossa of the base of the skull. The lower border of the posterior half articulates with the vomer. The vomer is a single bone situated vertically at the back part of the nasal fossæ. At an early period it consists of two laminæ separated by a very considerable interval, and inclosing between them a plate of cartilage which is prolonged forward to form the remainder or cartilaginous portion of the sæptum. Ossification commences in the vomer at about the same period as in the vertebrae (about the sixth or eighth week of foetal life), but is not complete until after puberty; and the perpendicular plate does not begin to ossify until about the first year after birth. The coalescence of the laminæ takes place from behind forward, beginning about the third year. The cartilage of the sæptum, extending forward from between the two plates of the vomer, is somewhat triangular in form, thicker at its margins than at its centre, and completes the separation between the nasal fossæ in front. Bearing in mind this fact that the vomer is composed of two parallel laminæ which do not fully coalesce until after puberty—and in some instances do not coalesce at all *—we can most readily

* In the *Philadelphia Medical News* for January, 1882, Lefferts described a case of double sæptum in a man aged twenty-five. The upper half of the posterior edge of the partition was divided in the vertical direction into two distinct portions, which were separated wide enough to admit the end of a lead pencil between them. The space thus inclosed was triangular in shape, the widest part being above, and the mucous

see the effect that would be occasioned by the slightest imperfect development of either of these plates. Hypernutrition of one lamina would cause the other lamina to be pushed out of its normal line of growth; and, conversely, any lack of full development of one lamina would occasion corresponding deviation. Any such deflection in the vomer would naturally be accentuated in the cartilage of the sæptum. The probability of this view that the deflections result from defective development of the plates of the vomer is increased when we take into account the fact that scarcely if ever do we find two bones with precisely the same degree of development.

Morell Mackenzie * evidently alludes to this fact when he says: "It is not impossible that the deflection may result from the fact that ossification of the sæptum proceeds from centres situated in two different bones, and that these deposits of ossific matter do not subsequently meet in the same plane."

The fact that ossification begins in the posterior end of the sæptum and that coalescence takes place from behind forward, explains why that end is rarely observed to be markedly deflected. It is the middle and anterior portions that most commonly become deviated as a result of the abnormal conditions that are so frequently found in children after the third or fourth year. The unequal development of the plates of the vomer and the resulting deflection of the sæptum produced by these abnormal conditions become accentuated

membrane covering it had a natural appearance. Baumgarten, of Budapest, describes a case of a double nose with two cartilaginous sæpta and three nares.—*Rev. de lar., d'otol., etc.*, 1894, tome xiv, p. 10.

* *Diseases of the Throat and Nose*, 1884, vol. ii, p. 434.

as the development of the child takes place. Welcker * has not observed deflections of the sæptum before the fourth year, while Zuckerkandl † states that he has not observed them in children under seven years of age. Anton, however, has shown that these deviations may be congenital by the examination of fifty-six cadavers of newborn infants, in which he found deviations in nine cases (equal to sixteen per cent.).

The peculiar forms which deflections of the sæptum may assume can readily be explained in the light of the fact that the different plates develop unequally. Unequal development of the separate plates may take place in a vertical direction or in a horizontal direction. Thus, if we have a vertical overgrowth of the lamina on one side or a defective growth on the other, we may have simple deflection of the sæptum toward the side of greater development. Again, if we have an overgrowth in one plate in an anterior posterior direction, and of the other plate in a vertical direction, we may have the peculiar conformation of the sæptum called the sigmoid deflection, which naturally suggests the idea of redundancy of sæptal growth, as was first observed by Morgagni, ‡ Chassaignac # has also advocated this view.

Ingals || has emphasized the importance of local mal-nutrition as an ætiological factor in sæptal deflection, but, reversing the sequence of cause and effect, main-

* *Die Asymmetrie der Nase und des Nasen-Skelets*, Stuttgart, 1882.

† *Anatomie der Nasenhöhle*, Bd. i, S. 102, zweite Auflage, 1893.

‡ *De sed. et caus. morb.*, Lugd. Batav., 1767, epist. xiv, art. 16, vol. i, p. 207.

Bulletin de la Société de chirurgie, 1851-'52, tome ii, p. 253.

|| *Transactions of the American Laryngological Association*, 1882, vol. iv, p. 61.

tains that the "deflection of the sæptum usually commences in the cartilaginous portion, and that the flexion of the vomer, which often exists, is of mechanical origin, due to firm articulation of this bone with the cartilage." Others, among whom we may mention Delavan,* J. N. Mackenzie,† Sedziak,‡ and Rosenthal,‡ have, in a general way, considered defective development as an important factor in the production of sæptal deflection.

(b) *Diseases of the Sæptum.*—Hypernutrition of either side in excess of the other may readily be produced by diseases of the sæptum itself. An abnormal condition of the nasal sæptum, which may act as the exciting cause of deviation, is chronic disease of the tissues covering the sæptum, usually associated with more or less disease of other parts of the nasal passages. A condition of hypernutrition of the sæptum may be caused by the engorgement of the cavernous tissues which cover the lower posterior portion of the sæptum as well as the turbinated bodies. This cavernous tissue, as is well known, is so sensitive to irritation as to become readily engorged by any external or internal irritant. Therefore, when this tissue is subjected to frequent irritation, diseased action sooner or later takes place, resulting in chronic distention of the vessels. This hypernutrition tends to an increased growth of the structures, and, as Greville Macdonald || observes, results in a tendency to a vertical as well as a horizontal overgrowth. As, vertically, the sæptum lies between

* *Op. cit.*, p. 207.

† *Transactions of the American Laryngological Association*, 1887, vol. ix, p. 211.

‡ *Journal of Laryngology and Rhinology*, 1891, vol. v, p. 94.

* *Thèse de Paris*, 1888.

Diseases of the Nose, London, 1892, p. 195.

fixed limits, any increase in that direction must result in its being bent to one side or the other.

Supernutrition and a diseased condition of the sæptum may also result in spurs and ridges along the sæptum. These spurs and ridges are usually found located along the articular surfaces of the sæptum; that is, (1) along the line of junction of the vomer with the superior maxilla, and (2) along the line of junction of the anterior border of the vomer with the triangular cartilage of the sæptum and the lower posterior part of the perpendicular plate of the ethmoid, and (3) along the line of junction of the anterior border of the ethmoid with the triangular cartilage. The exostoses may be unilateral or bilateral. The ridges along the junctions of the vomer with the triangular cartilage and with the superior maxilla are more often bilateral than the ridges elsewhere. When occurring upon one side of the sæptum alone, they are frequently looked upon as constituting a deviation of the sæptum, but they are by no means a condition of deflection. Inflammatory states may not only be excited by a hypernutrition of the part, but may also result from inflammation set up by reason of external influences producing a condition which may be looked upon as an arthritis. These excrescences may indeed be the direct cause of the deflection of the sæptum, by reason of the pressure which the turbinated bodies may exert upon them, forcing them and the sæptum over to the opposite side. This condition, however, is not common; for these outgrowths and ridges are usually found upon the projecting or prominent portion of the angle of deflection, and may therefore be looked upon as the result of the condition that has been the primary cause of the deviation.

(c) *Diseases of Other Portions of the Nose.*—Malformation of the superior maxilla and a very small and highly arched hard palate have so frequently been observed to be associated with deflection of the sæptum as to make it necessary to regard them as an exciting cause. This view was first suggested by Trendelenburg,* but especial attention was directed to it by Jarvis,† who says that of a number of instances of highly arched palate, in every case deflection of the sæptum was found. He also states that this condition was hereditary in a number of cases in which he had traced it through several generations.

Welcker ‡ has pointed out that a deflected sæptum is frequently associated with more or less disproportionate development of the whole face. The orbits may lie on different planes, resulting, as a matter of course, in various ocular troubles, and the superior maxilla and alveolar processes may be developed unequally, which may possibly have resulted, as Bosworth § suggests, from scoliosis of the whole face.

In nearly all cases of deviation of the sæptum we find the turbinate body on the concave side of the sæptum very greatly hypertrophied, whereas the turbinate body on the convex side of the sæptum may be comparatively small, or at least not in a condition of hypertrophy. An interesting question has arisen in connection with this fact as to which is the cause and which is the effect. Baumgarten || and some others maintain that the hyper-

* Cited by Schaus, *Archiv für klin. Chirurgie*, Bd. xxxv, Heft 1, 1887.

† *Medical Record*, vol. xxvii, p. 284.

‡ *Loc. cit.*

§ *Diseases of the Nose and Throat*, 1889, vol. i, p. 288.

|| Ueber die Ursachen der Verbiegungen der Nasenscheidewand. *Deutsche med. Woch.*, 1886, Bd. xiii, S. 373.

trophy of the turbinate body has been the exciting cause of the deviation, forcing the sæptum over to the opposite side, whereas others believe that the hypertrophied turbinate body is the result of the sæptum being deflected from the median line. This latter view is, to my mind, the correct one, for the reason that we usually find the turbinate body on the concave side of the sæptum sufficiently hypertrophied to fill the space, while not hypertrophied enough to press against the sæptum. On the convex side, however, we find the sæptum pressing closely upon the turbinate body. If the deflection of the sæptum had been the result of the pressure, the pressure found upon the convex side would have been sufficient to force the sæptum into the median line, or to the opposite side. I believe it is false, however, to hold that the deflection has had nothing to do with the hypertrophy of the turbinate body. The hypernutrition has been caused by the irritation consequent upon the excessive amount of air passing through the unobstructed passage, producing vascularity and hypernutrition of the part. Hypertrophy may be a compensation of Nature for this extra work. It is a well-known fact of observation that when the respired air passes through one nostril only, sooner or later irritation of this nostril is set up. In normal respiration the current of air that passes through the nostrils is equally divided, but when the respiratory current passes through one side only it causes dryness of the passage, irritates the nostril, and there is ultimately more or less diseased action. It is a rule that should be invariably observed that no matter how easily respiration may be carried on through one nostril, the other nostril should be opened so that an equal amount of

air may pass through it, although it may not be necessary to make the passage as wide or free as the other nostril, which may be abnormally large. It is almost invariably the case that we find the most disease in the nostril through which the greater current of air passes, and very frequently we see an aggravated form of so-called nasal catarrh in the free nostril very rapidly become ameliorated by establishing free respiration through the other side.

The obstruction of the anterior portion of the nasal passage when the other portion of the passage remains free is undoubtedly sometimes the cause of deviations of the sæptum, although not the main cause, as it is believed to be by Collier.* The direct effect of obstruction of the anterior portion of the nasal passage during respiration is to cause more or less rarefaction of the air in that nasal chamber, which, acting upon the normally thin and easily yielding sæptum, particularly in children, will cause a bending of the sæptum toward the nasal chamber in which the air becomes rarefied, or, in other words, in which the normal atmospheric pressure is reduced by the inspiratory current. The effect of obstruction of the nostrils in the production of deformities of the face is very clearly shown by Ziem † in his experiments of artificially blocking one nostril in young animals. In every case there was defective development of the side of the face and skull on the side of the obstructed nostril.

Obstruction of the anterior portion of the nasal chamber may be caused by temporary excessive vascularity and turgescence of the turbinate tissue of the

* *Journal of Laryngology and Rhinology*, vol. v, 1891, p. 501.

† *Monatsschrift für Ohrenheilkunde*, 1883, Nos. 2, 3, 4, and 5. /

anterior portion of the turbinated body, or by a chronic condition of turgescence and hypertrophy of this tissue. Or the obstruction may be the result of foreign growths, or from synechia, the result of previous ulceration. It may also be due to dislocation of the triangular cartilage, occluding the nostril. A flattened condition of the ala of the nose may also occlude the nostril. Such flattened condition may be due either to the destruction of the shield cartilage of the ala, or to a condition of paralysis of the dilator muscles of the nostril. This latter point has been emphasized by Collier.*

2. *External Exciting Causes.*—The main external exciting cause of deviation of the sæptum, particularly of the anterior portion, is traumatism. The vast number of cases of deflection in which a distinct history of trauma can be obtained leaves but little to be desired in the way of proof on this point. Traumatism is considered the main cause of deviation of the nasal sæptum by Bosworth, † Geuzmer, ‡ Ziem, § Bresgen, || Schaeffer, △ Woakes, ◇ Walsham, ‡ Voltolini, ‡ Stoker, ‡ Moure, ** Rosenthal, ‡‡ and Lennox Browne. ‡‡

* *Op. cit.*, p. 506.

† *New York Medical Record*, 1887, vol. xxxi, p. 115.

‡ *Revue de chirurgie*, 1887, No. 12.

§ *Allgemeine med.-Centralzeitung*, Nos. 20, 23, 1886.

|| *Wiener medicinische Presse*, 1887, Bd. xxviii, S. 237.

△ *Chir. Erfahrungen in der Rhin. und Lar.*, 1885, Wiesbaden.

◇ *Journal of Laryngology and Rhinology*, 1890, vol. iv, p. 437.

† *Ibid.*, p. 439.

‡ *Die Krankheiten der Nase*, 1888, S. 108.

§ *Deviations of the Nasal Sæptum*, 1888, London.

** *Journal of Laryngology and Rhinology*, 1890, vol. iv, p. 495.

‡‡ *Sur les déformations de la cloison du nez et leurs traitements chirurgicaux*, 1888, Paris.

‡‡ *The Throat and Nose and their Diseases*, p. 587, 1890, London.

Traumatism may produce deviation of the sæptum in a variety of ways. It may result either in direct dislocation of the triangular cartilage at its point of attachment with the perpendicular plate of the ethmoid and the vomer, and at the attachment of the perpendicular plate of the ethmoid with the vomer, or the attachment of the triangular cartilage and the vomer with the superior maxilla. The dislocation may take place singly, or there may be more or less disturbance or dislocation of all these attachments at the same time, should the external forces be sufficient. These dislocations are more apt to take place in children than in adults, owing to the incompleteness of the attachments during childhood. The dislocation, however, may be slight in the child at first, but as the growth of the sæptum proceeds, the deflection becomes correspondingly accentuated.

Dislocation of the triangular cartilage is, however, one of the most frequent deformities of the sæptum as a result of traumatism, owing to the frequency of slight blows upon the nose that are not of sufficient force to cause disturbance of the attachment of the perpendicular plate of the ethmoid with the vomer, and also owing to the fact that the triangular cartilage is much the thinnest portion of the sæptum, and is most easily disturbed by external causes. In many cases there may be no history of traumatism, since the deflection may have resulted from an accident that has long since been entirely forgotten, but which was, nevertheless, the primary cause, as can be readily seen from the overlapping of the parts, which could not easily have resulted from any other cause. The probability that these deviations result from traumatism, though there may be no history of such accident, is heightened by the fact that

these cases are found three or four times more frequently in boys than in girls, and in men than in women, the masculine sex being more exposed to injuries of the nose than the feminine. In such cases of deviation, one of the best proofs that the deflection is the result of traumatism is the fact that we almost invariably find a great amount of callus thrown out on the convex side of the angle of the two articulated surfaces, whereas if the ridge had been thrown out as the result of disease of the articulated surfaces, it would be unilateral.

Among other external influences which are believed to be the cause of deviation, habitually blowing the nose with the same hand has been mentioned by Morell Mackenzie.* A diseased condition of the interior of one nostril, producing a hypersecretion from that nostril, and a person habitually closing the opposite nostril by pressure with the thumb or finger in order to clear the passage of the discharge, and the habit of inserting the finger into one nostril to remove scabs, crusts, etc., would also have a like effect. This does not of itself seem a sufficient cause for the production of a deformity, although it is quite probable that deflection of the end of the nose quite frequently results from this cause, since misshaped noses in the young may be molded into symmetrical form, as was the custom of the ancient Persians with babes of the royal blood, for no man was allowed to sit upon the throne who had a crooked or deformed nose.†

On considering the constant and extreme variations which take place in the composite races in the develop-

* *Diseases of the Throat and Nose*, vol. ii, p. 434.

† Mackenzie, *Transactions of the American Laryngological Association*, 1885, vol. vi, p. 107.

ment of the osseous structures, and particularly those of the face and skull, it is not surprising that these variations should occur quite as frequently in the nasal sæptum as in other parts. One can not be more forcibly impressed by the frequency of these variations than by examining the various cavities contained within the skull, and particularly the accessory sinuses of the nose. In the examination of any number of skulls no two cavities in the same or in different skulls will be found to be of exactly the same shape, size, and dimensions. Therefore, the great variations that take place in the size and shape of the nasal cavities and the sæptum can not be wondered at.

From the present status of our knowledge regarding the ætiology of deflections of the nasal sæptum we may draw the following conclusions:

1. That deviations of the sæptum are produced by a variety of causes operating upon different persons; and that upon the same person several different influences may be operating at the same time.
2. That heredity plays a very important part as a predisposing cause, not only by the dyscrasias which may be transmitted, but by the blending of different races in the composite type, which brings about an infinite variation in the conformation of the osseous and cartilaginous structures.
3. That the three local causes most frequently producing deviation, spurs, and ridges of the sæptum are trauma, nasal obstruction, and unequal growth of the different component parts of the vomer. The last-mentioned cause is itself produced mainly by local malnutrition or diseased conditions of the structures of the nasal passages, inducing an unequal development of the

two sides of the sæptum, which causes a bulging or bending to the side of greatest development. The fact that the vomer is composed of two laminæ, separated by a plate of fibro-cartilage which is continued forward to form the triangular cartilage of the nose, readily explains how this unequal development takes place.

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FRANK P. FOSTER, M.D.

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